

SETTING



Figure 1. (Typical Pasture in the Mancos Valley)

The Mancos Valley Salinity Control Unit is located within eastern Montezuma County in the southwest corner of Colorado. It lies between prominent physiographic features such as the La Plata Mountains, with peaks over 12,000 feet in elevation to the northeast, and Mesa Verde rising to an elevation of about 8,400 feet on the southwest. The elevation at Mancos is about 7,000 feet above sea level.

The climate is semi-arid with an average annual precipitation of 17.9 inches. Most of the moisture comes in late summer rains and snowfall. The annual mean air temperature is 46° F, with an average growing season of 110 days.

The total drainage area of the Mancos Valley is 131,200 acres. This includes the Mancos River and its major tributaries Mud Creek, Weber Creek, and Chicken Creek.

Water

The project area is irrigated by surface water. The major source of irrigation water is the Mancos River with a mean daily flow of 48 cubic feet per second. At a point just above the project area it has a median total dissolved solids value of 230 mg/l. Downstream of the project area it has a median value of 1345 mg/l. The increase indicates the magnitude of loading from the project area. Other minor water sources to the project area include Chicken Creek and Lost Canyon Creek. There are no known regional plans for water resource management that might be impacted by project action.

Geology

Shale of the Mancos Formation underlies much of the Mancos Valley area. To the east and west and on Weber Mountain, it is overlain by the Mesa Verde formation. To the north, it is bordered by outcrop areas of sandstone from the Dakota Formation or covered by alluvial and colluvial deposits. The Mancos Formation, consisting mainly of gray silty clay shale of marine origin, is the principal source of salt-loading in the Mancos Valley. Figure 2 depicts the distribution the Mancos formation. The watershed boundary associated with the project area is outlined with a black line on the map. The salts consist mainly of various sulfate minerals, which are concentrated in certain zones within the shale and younger shale-derived alluvial deposits. These shale-derived alluvial deposits are usually a few feet below the ground surface in the more arid, lower portions of the valley. Here, the natural infiltration of precipitation and runoff water was not sufficient to move the salts through the soil and bedrock profile into the natural stream drainage system and the salts remain deposited in these materials. However, the application of excess irrigation water to the area has increased the amount of water moving through the soil profile and thereby increased salt loading in downstream waters.

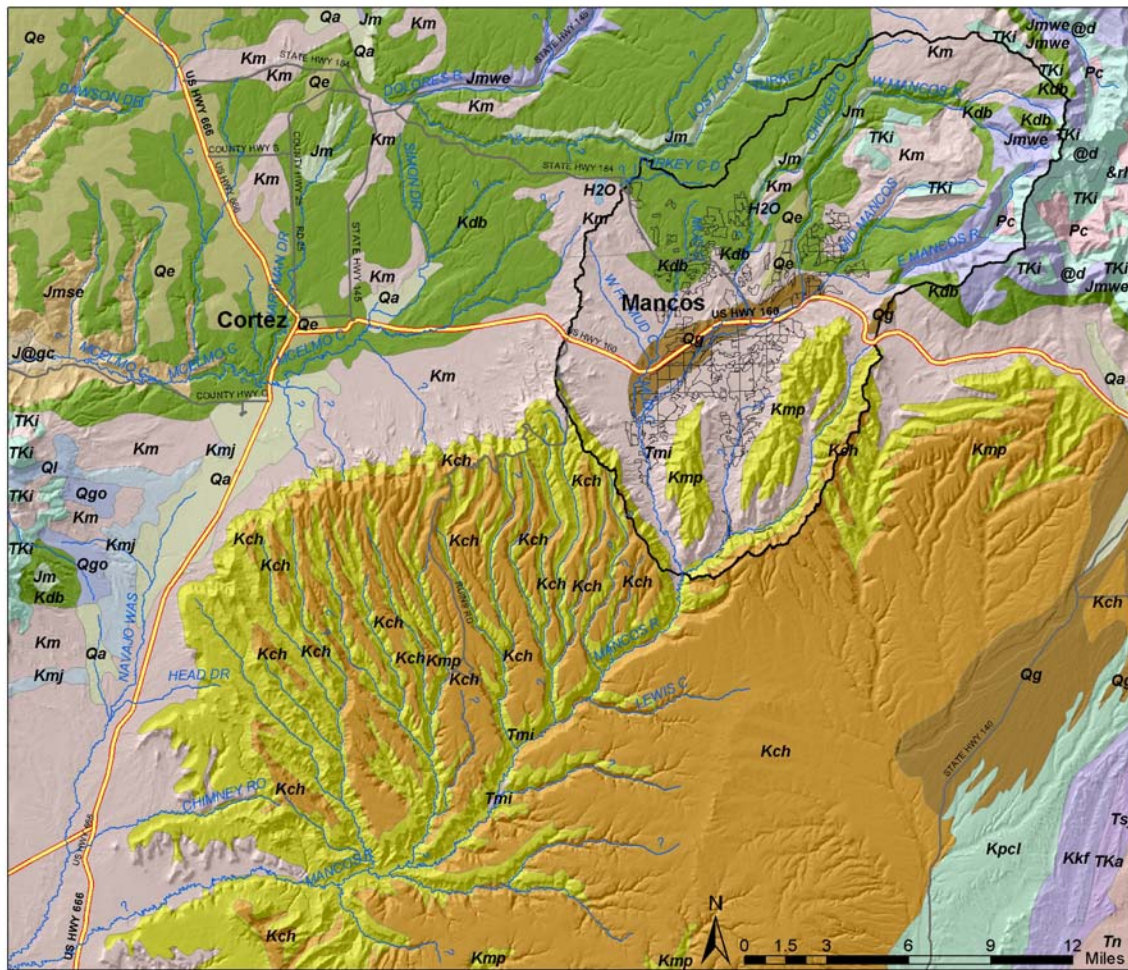


Figure 2 (Surficial geology in the vicinity of the Mancos River) Km – Mancos Shale; Kdb – Dakota Sandstone and Burro Canyon Formation; Qg – gravels and alluviums; Qe – eolian deposits; Tki – Laramide Intrusive Rocks; Kmp – Menefee Formation and Point Lookout Sandstone; Kch – Cliffhouse Sandstone; Jmwe – Morrison, Wanakah, and Entrada formations; Jmse – Morrison Formation, Summersville Formation and Entrada Sandstone; Qgo – older gravels alluviums (Tweto 1979).

Another minor source of salt-loading in the valley is a zone of salt associated with the coal bed lying in the upper part of the Dakota Formation. This coal bed is overlain by several feet of resistant sandstone and is only infrequently exposed. Where this sequence of coal and sandstone lies near the surface in irrigated areas, the slow infiltration of irrigation water through fractures in the sandstone and the coal bed results in the gradual leaching and delivery of salts to the stream system.

Irrigated areas where salt-loading is most apparent from surface saline seeps include: (1) the Mud Creek Drainage on the northwest side of the valley; (2) the area on the south and east side of the Mancos River downstream from the town of Mancos; and (3) the upper valley area of Weber Canyon. Flows of high saline water also occur from several draws in the dry cropland area on the west side of Mud Creek. In most of these areas, the

ground water moves generally downward through permeable sandy alluvium or fractured shale to a firm shale layer and then laterally on this firm shale layer to enter the stream system along the larger drainage ways.

Soils

The soils in the Mancos Valley area can be grouped into three general types: (1) terraces and flood plains; (2) alluvial fans; and (3) hillsides and escarpments.

The soils forming on terraces and flood plains encompass diverse textures and drainage. The lower terrace and flood plain adjacent to the Mancos River have deep, well drained to poorly drained soils. They formed in alluvium derived from mixed sources. Surface textures range from stony sandy loam to clay loam. Slopes range from 0 to 3 percent. The higher terraces are deep and well drained. They formed in fine textured eolian material and alluvium. In some places these soils are underlain by gravelly, cobbly, and stony alluvium at varying depths. Surface textures are loam, clay loam, or silty clay loam. Slopes range from 0 to 6 percent.

The soils forming on alluvial fans are deep and well drained. They formed in fine textured alluvium derived from reworked eolian material and shale. Surface textures are clay loam, loam, and silty clay loam. Slopes range from 3 to 12 percent.

The soils forming on hillsides and escarpments (generally not irrigated) are shallow to deep and well drained. They formed in alluvium and residuum derived dominantly from shale, mudstone, and sandstone. Surface textures are highly variable and commonly are modified with rock fragments. Slopes range from 12 to 80 percent.

The best soils for irrigation in the Mancos Valley are the alluvial deposits that are red to brown in color. They vary in texture from clay loam, loam, to silty clay loam, and occur in a series of small river terraces. These soils rarely have significant alkali or drainage problems. Approximately 60% of the irrigated acres are on these soils.

The soils found mainly in the river and creek bottom are alluvial deposits that vary from well drained to poorly drained soils. These are light gray to gray in color, and tend to become alkaline. They encompass 25% of the irrigated area.

A small portion of the land in the irrigated area (15%) has textures that are stony and gravelly loams. These contain little organic matter, are generally free from alkali and usually well drained, but generally are too shallow for good farming. These soils are located in upper portion of the valley.

Cultural Resources

The Mancos Valley contains and is surrounded by significant cultural resources dating to prehistoric and historic eras. This area has a long history of archaeological research. The watershed area to be treated has been altered by approximately 47 canals/ditches in order to farm the land (Colorado River Salinity Control Program, 1984). The estimated land that can be irrigated is approximately 11,700 acres, and the earthen canals/ditches cover over 100 miles. The irrigation ditches/canals of the Area of Potential Effect (APE) are similar to many other ditches in Colorado. Roads and houses are part of the modern landscape. The reservoirs in the northern portion of the study area include Jackson Gulch or Mancos Reservoir, Summit Reservoir, and Weber Reservoir. Bauer Lake is in the northern portion as well. The San Juan National Forest covers the northern portion of the study area, and BLM land covers portions of the southern part. Mancos State Recreation Area and Mesa Verde National Park provide additional tourist activity.

Significant Features

A cultural resource investigation has begun and is ongoing. A literature review has been completed. The State Historic Preservation Office has been consulted in order to locate any sites that exist in the project area. The prehistoric sites in the area that have been determined eligible for listing on the National Register of Historic Places currently have ditches crossing them. Two of the previously identified features are an old railroad grade and a pipeline running through the northern part of the study area. Other cultural resources identified include seven historic ditches, a segment of historic highway, three prehistoric components, two historic components, and seven isolated finds. The isolated finds are not eligible for listing on the National Register of Historic Places (NRHP). Refer to the attached archaeologist report in Appendix D.

Consultation

A file search was submitted to the Office of Archaeology and Historic Preservation on July 10, 2001. The results of the file search are presented in summary fashion to protect information regarding locations. Prehistoric materials, historic mines, railroad camps, railroad beds, canals, and homesteads are prevalent throughout the area.

Land Ownership

Montezuma County encompasses 1,341,900 acres, consisting of 375,700 acres of private land, 433,000 acres of the Ute Mountain Ute Indian Reservation, and 533,200 acres of public land. The 53,000 acres of public land administered by the National Park Service lies within Mesa Verde National Park, including small amounts in Yucca House and Hovenweep National Monuments. The 260,000 acres of Forest Service land comprise about 14 percent of the San Juan National Forest in southwestern Colorado, with the bulk of the forest lying to the east. State and local governments control less than one percent of the total area and lease most of their land to farmers and ranchers. The Ute Mountain

Ute Indian Reservation, in addition to its 433,000 acres in Montezuma County, includes 107,500 acres in New Mexico and 13,500 acres in Utah.

Irrigated agriculture is suited to the area, with an estimated 10,800 acres currently irrigated by the main 26 ditches. The full-time irrigated farms in the Mancos valley average 185 irrigated acres. The 55 part-time farms average 33 irrigated acres each. The average per acre value of agricultural land in Montezuma County is \$411 ^{1/}, with irrigated cropland ranging from \$1,000 to \$3,000 per acre. The number of farms by value of sales are shown on Table 4. The average ranch size is 1,303 acres, while the median farm size is 97 acres.

Table 4: Number of Farms by Value of Sales in Montezuma County

Value	No.
\$100,000 and over	43
\$50,000 – 99,999	41
\$10,000 – 49,000	212
Less than \$10,000	422
COUNTY TOTAL	718

1/ Bureau of Census 1997 Census of Agriculture Colorado, U.S.
Department of Commerce

Future "without" (No Action) and Future "With" (Proposed Action) cropping patterns and yields for the Mancos Valley Salinity Study Area are shown in Table 5. Mancos Valley typically is experiencing one percent growth per year. Estimated loss of irrigated farm land to non-agricultural uses will be approximately 100 irrigated acres over the next 25 years. This acreage has already been subtracted from the total acreage to arrive at the 10,800 acres of irrigated cropland in the area being considered for program action.

Table 5: Irrigated Cropping Pattern

CROP	CROPPING PATTERNS		YIELDS	
	FUTURE WITHOUT	FUTURE WITH	FUTURE WITHOUT	FUTURE WITH
Alfalfa and Hay	48.1%	55.5%	3.1 tons	4.0 tons
Pasture	38.2%	28.6%	3.4 AUMs (a)	5.0 AUMs (a)
Small Grain	13.7%	15.9%	60 bushels/acre	70 bushels/acre

(a) Animal unit month (AUM) = The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

The anticipated change in crop yield and increase in AUMs will occur as a result of more uniform and timely water distribution, and the ability to maintain a stand of more palatable forage species on the pasture fields. The irrigated acreage is not expected to change. Conversion to improved flood and side roll sprinkler systems also typically reduce competition and water use by weeds in the irrigated area.

Social and Economic Characteristics ^{1/}

The Mancos Valley occupies the east central part of Montezuma County in the southwest corner of Colorado. Montezuma County is one of the least populated counties in the State with 23,999 people (2000 Census). The average of 11.3 people per square mile is low compared to the State average of 41.4. Population concentrations include Cortez (8,681), Dolores (1,131), Mancos (866), and the Ute Mountain Ute Tribe at Towaoc (1,097).

Over the past 20 years, the population in Montezuma County has increased from 16,510 to 23,830 people. During this time, there have been significant variations in population, although the area has remained generally rural.

Initial growth was directly related to mining. Agriculture did not become significant until after 1890, when irrigation water was first delivered into the Valley. Until 1950, most of the population growth was a result of the expanding agricultural industry. Growth was relatively uniform and gradual until the decade of 1950-60 when oil exploration caused a sharp increase from 9,991 to 14,024 during this 10-year period. Following 1960, oil explorations dwindled and the population declined sharply, although it remained above the 1950 level. Between the years 1960 and 1970, the population in Montezuma County decreased while population in the 1970's, again grew significantly due to renewed oil interest and construction of the Bureau of Reclamation "Dolores Project."

The "Dolores Project" was designed to divert and store water from the Dolores River for irrigation of arable dry lands and supplemental irrigation water to other areas in

Montezuma and Dolores Counties. The Mancos Irrigation System will not receive additional water from the “Dolores Project.” Since the 1980s, tourism and energy products have supported the County’s population growth.

1/ 2000 Census of Population and Housing, U.S. Census Bureau

Table 6: Population 1930-2000 in Montezuma County

Year	Montezuma County	Colorado
1930	7,798	1,035,791
1940	10,463	1,123,296
1950	9,991	1,325,089
1960	14,024	1,753,947
1970	12,024	2,209,256
1980	16,510	2,888,834
1990	18,672	3,294,394
2000	23,830	4,301,261

American Indians and Hispanic Americans, the largest minority groups, comprise 20.3 percent of the county population. Approximately 2,676 American Indians reside in the county; most of them belong to the Ute Mountain Ute Indian Tribe at Towaoc, 11 miles south of Cortez. Of all American Indians in the area, 90 percent reside in Towaoc, which is outside of the Mancos Valley. Also, the 2000 census estimated that 2,263 people in the county are of Hispanic American origin, with nearly 47 percent living in the City of Cortez.

The population identified by Race and Origin from advance reports of the 2000 Census is shown in Table 7.

Table 7: Population by Race (2000) in Montezuma County

	Total	Race					
County Subdivisions		White	Black	Indian * Eskimo & Aleut	Asian & Pacific Islander	Other	Hispanic **
Montezuma County	23,830	19,474	33	2,676	48	1,594	2,263
Mancos town	1,119	992	-	25	0	102	139
Pleasant View Division	495	477	-	5	1	12	12
Ute Mountain division	1,138	18	-	1,111	-	9	9

* American Indian.

** Included in white totals.

Short term growth in the county has occurred due to the Dolores Project. Little additional growth from implementing the Mancos Valley Salinity Control Program is anticipated. The reduction in construction workers from the Dolores Project will more than offset any slight increase from the Salinity Control Program. Increased housing needs, therefore, should not be a problem and relocation of people is not anticipated.

Long term population projections for the county estimate about one percent per year growth which likely will follow historical growth trends. Major growth impacts will be from the Dolores Project development, expansion of the agriculture and tourist industries, the desirability of the area for retirement, and the continued development of nearby energy resources.

Mancos has a work force of about 554 persons ^{1/} including 525 presently employed. The unemployment rate is 3.3 percent compared with 8.9 percent unemployed for Colorado.

Employment data shows that management and professional employment are the largest employer. Other large employers include local government, sales, services and construction.

1/ 2000 Census and Population and Housing, U.S. Census Bureau

Wildlife Resources

Agricultural land, coniferous forests, drainages, wetlands, and brush land combine to provide a high diversity of wildlife habitat in the Mancos Valley. Much of this diversity has been induced by irrigated agriculture, which began in the 1890s. Irrigation converted a dry basin into many kinds of habitats, including ponds, marshes, reservoirs, cropland, and those habitats created by the irrigation water conveyance system (canals, laterals, and ditches). All wildlife and wetland resource information has been reviewed with both the US Fish and Wildlife Service and Colorado Division of Wildlife.



Figure 3. (Typical grassy earthen ditch)

Threatened and Endangered Species: Suitable habitat for the following threatened or endangered species is found in or near the watershed: bald eagle (*Haliaeetus leucocephalus*), Southwestern willow flycatcher (*Empidonax traillii extimus*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), Mancos milk-vetch (*Astragalus humillimus*), and Mesa Verde cactus (*Sclerocactus mesae-verdae*).

Bald eagles nest, roost, and perch in large cottonwood trees adjacent to reservoirs and rivers. These types of suitable habitat are found within the Mancos Valley watershed. A nest site does exist at the upper end of the project area near Bauer Lake, according to Colorado Division of Wildlife. This particular nest is in a mature Ponderosa pine. None of the practices will have an Effect on these habitat types.

Southwestern willow flycatchers utilize dense willow, cottonwood, and buffaloberry thickets (preferably a layered system of all three) with surface water or saturated soil adjacent to or nearby the stand. Flycatcher habitat is interspersed throughout the project area along ditches and the perennial drainages. It consists of primarily monotypic coyote

willow stands and layered stands of willow, narrowleaf cottonwood, buffaloberry, and wild rose. The river bottom consists mainly of narrowleaf and Fremont cottonwood with limited pockets of shrubby understory. All of the listed woody species are native to the Mancos Valley and are suited to the climatic conditions with or without irrigation. Typically their growth and extent is enhanced by irrigation and excess irrigation water.

No known nesting pairs of Southwestern willow flycatcher have been observed in the valley; however, migratory use is evident. Possible flycatcher habitat may be affected by practices installed under the proposal. Direct mechanical impact to shrubs along sections of ditch will occur where they are removed or replaced by buried pipe. However, many of the ditches will be replaced without direct mechanical removal and substantial woody vegetative should remain as irrigation overflow and seepage from adjacent farm fields will support these species. In addition Mancos Valley is in a 17.9 inchES average annual precipitation zone and many of the species will survive without supplemental moisture. Irrigation pipelines have been installed in the Mancos Valley without significant loss of woody vegetation. However, as part of the overall project monitoring woody vegetation habitats will be evaluated to measure changes that impact habitat values. Habitat values lost will be replaced with program funds as part of this project proposal.

The anticipated habitat losses will be replaced by enhancing riparian vegetation along the river corridor within and adjacent to the project area. The Mancos River, various perennial drainages, and the many ponds found throughout the valley will provide adequate water sources and the potential to improve habitat. The proposal intends to use program funds to work with willing landowners along the river corridors to protect and enhance riparian habitat above the values lost. The opportunity exists to improve the shrubby understory component of the natural riparian areas through management to create more contiguous and larger habitats.

Colorado pikeminnow and Razorback sucker habitat is associated with the downstream riverine system entering into and including the San Juan River. No habitat exists directly in the project area. Depletion to this habitat type downstream will not occur. In all actuality, these species habitat type should be positively impacted.

Mancos milkvetch is found on sandstone ledges in pinyon/juniper woodlands. None of the proposed practices will affect this type of habitat.

Mesa Verde cactus is found on sparsely vegetated shale or adobe clay badlands. None of the proposed practices will affect this type of habitat.

Yellow-billed cuckoo is currently a candidate for listing as a threatened and endangered species. This species is found in dense riparian habitat associated with watercourses and mature cottonwood stands in the Mancos Valley. These habitat types can be found in the project area. According to the Colorado Division of Wildlife, the yellow-billed cuckoo is expected to be utilizing the Mancos Valley, however, it is not commonly found there. There are no confirmed nesting sites, but it may be presumed they do nest in the Mancos Valley area. The Mancos River bottom is the likely habitat for this species, and none of

the proposed water quality practices will adversely affect this type of habitat. Potentially, riparian areas may be improved for the cuckoo as tree and shrub habitat is replaced or enhanced through NRCS wildlife program activities. The project will offer wildlife habitat cost share contracts for interested landowners along the river corridor and other suitable areas to promote habitat development or enhancement.

The Northern leopard frog could occur in wetland habitats in the watershed if the wetlands have adequate cover. Effects on wetland habitats will be mitigated and riparian areas will be improved, resulting in no net negative effects on leopard frogs or their habitats.

Northern and Botta's pocket gophers use a variety of habitats including pasture land and agricultural fields. Either species could occur in this part of Colorado. The project could have an effect on pocket gopher habitat if gopher burrows are intersected by earthmoving equipment during pipeline installation or ditch lining. Little or no effect on gophers and their habitats is expected because gopher use of these wet areas is minimal. The project plan has minimal earthmoving or excavation on drier, upland sites where gophers are more likely to occur.

Ferruginous hawks may use the watershed area for foraging and to meet other habitat needs. Agricultural areas may be more important to these hawks in the winter. They may use cottonwoods and other tall trees for perches. The value of these habitats for hawks should not be affected by the project.

American peregrine falcons use cliffs and forested areas for breeding habitat. They also use riparian forested areas, grasslands, and agricultural fields in for foraging. This project will maintain or improve riparian habitat and the irrigation improvements planned on the agricultural fields should not change the availability of prey species taken by falcons. The end result is that falcon habitat will be maintained or improved with the project.

Northern river otters use riparian habitats where fish and crustaceans are found. They also need good water quality and adequate flow volumes. Planned practices to improve the riparian area should benefit otter habitat in the project area.

Table 8: Summary of Threatened and Endangered Species

Scientific Name	Common Name	State Status	Federal Status	Occurrence
<i>Haliaeetus leucocephalus</i>	Bald Eagle	T	T	Winter resident & one known nest. No negative effects expected.
<i>Empidonax traillii extimus</i>	Southwestern Willow Flycatcher	E	E	Migrate through the area. No known nesting but possible in the area.
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	SC	C	Possible, but none observed. Suitable habitat exists and may be enhanced.
<i>Ptychocheilus lucius</i>	Colorado Pikeminnow	T	E	No suitable habitat in watershed. Habitat downstream may be improved.
<i>Xyrauchen texanus</i>	Razorback Sucker	E	E	No suitable habitat in watershed. Habitat downstream may be improved.
<i>Astragalus humillimus</i>	Mancos Milkvetch	❖	E	Possible – Not found in irrigated areas. No negative effects expected.
<i>Sclerocactus mesae-verdae</i>	Mesa Verde Cactus	❖	E	Possible – Not found in irrigated areas. No negative effects expected.
<i>Rana pipiens</i>	Northern leopard frog	SC	❖	May occur in aquatic habitats. Project should improve or maintain habitat.
<i>Thomomys</i> spp.	Pocket gopher	SC	❖	May occur in agricultural land. Any activities that will disturb the ground surface should be outside their use areas.
<i>Buteo regalis</i>	Ferruginous hawk	SC	❖	May use the area for hunting, especially in winter.
<i>Falco peregrinus anatum</i>	American peregrine falcon	SC	❖	May be in the watershed. No effects expected.
<i>Lontra canadensis</i>	River otter	ST	❖	May occur in the area. Project should either improve their habitats or have no effect.

Summary of threatened and endangered species and their status within the proposed Mancos Valley Salinity Control Area. Abbreviations for species status include E = Endangered, T = Threatened, P = Proposed, C = Candidate, SC = Species of concern, ❖ = No Status.

Other Threatened or Endangered Species and Species of State Concern

Several extirpated species occur on the Federal list of threatened and endangered species in Colorado. These are the grizzly bear, gray wolf, and black-footed ferret. Because these species are extirpated the project should have no effect on them.

The boreal toad, Canada lynx, and wolverine use higher elevation, forested or wetland habitats that are not found within the project area. The project will not affect the following species or their habitats because the species do not occur in the project area or the vicinity. Gunnison sage grouse do not occur in or near the project area in eastern Montezuma County. Mexican spotted owls use coniferous forested habitats and rocky canyons that are not found within the project area. Kit fox typically occur in shrublands in Colorado. The only known kit fox populations in Colorado are located several counties north of Montezuma County.

Other Fish and Wildlife Resources-Upland Wildlife Species

Game species found in the area include: mule deer, elk, Merriam's turkey, cottontail rabbit, black bear, and mountain lion.

Non-game species are widely represented in the valley with a variety of shorebirds, neo-tropical birds, small mammals, reptiles, and amphibians adding diversity to the wildlife in the area.

Other Fish and Wildlife Resources-Other Fish Species

Fish species inhabiting the project area include such game fish as rainbow trout, brook trout, largemouth bass, and catfish. Native fish include cutthroat trout, round tail chub, flannel mouth sucker, bluehead sucker, speckled dace, fathead minnow, and mottled sculpin.

Other Wildlife Species

Various waterfowl, shorebirds, and neo-tropical birds inhabit or frequent the area, including: several species of ducks, Canada geese, great blue heron, sora rail, red-winged blackbird, yellow-headed blackbird, and marsh wren.

The various raptors found in association with the watershed include: Red-tailed hawk, Cooper's hawk, sharp-shinned hawk, northern harrier (marsh hawk), peregrine (prairie) falcon, rough-legged hawk, ferruginous hawk, and great horned owl, and others.

Amphibians and reptiles inhabiting the valley include: chorus frog, leopard frog, woodhouse toad, spadefoot toad, tiger salamander, wandering garter snake, black (garter) snake, Western green snake, Western bull snake, (Western kingsnake), Western prairie rattlesnake, (fence lizard), sagebrush lizard, and mountain short-horned lizard.

Wetlands



Figure 4. (Typical PEM wetland in the Mancos Valley)

This would be the most likely impacted wetland type in the project area. Wetlands (Cowardin, et al., 1979) in the watershed are found in association with the numerous irrigation laterals and ditches (see table 9), and the natural drainages (Mancos River, Chicken Creek, Mud Creek, and Weber Creek) and their tributaries in the valley. Wetlands associated with the natural drainages are primarily Palustrine Forested Temporarily Flooded (PFOA), Palustrine Scrub Shrub Temporarily Flooded (PSSA), Palustrine Emergent Seasonally Flooded (PEMC), Riverine Upper Perennial Unconsolidated Shore (R3USC, R3USA), Riverine Upper Perennial Unconsolidated Bottom (R3UBF, R3UBH), Palustrine Aquatic Bed Semi-permanently Flooded (PABF), and Riverine Intermittent Streambed (R4SBA). Those associated with seepage from various ditches and laterals include Palustrine Emergent Seasonally Flooded (PEMC), Palustrine Scrub Shrub Temporarily Flooded (PSSA), Palustrine Emergent Semi-permanently Flooded (PEMF), and Palustrine Emergent Saturated (PEMB). Numerous

ponds (Palustrine Aquatic Bed-PAB) are also found throughout the watershed on both cropland and non-cropland. Since many of the wetlands are associated with irrigation water, the project may result in a loss or reduction in size of these irrigation induced wetlands. Table 9 shows the estimated wetland acreage and characteristics within the project area based on recent analysis.

Table 9: Wetland Types and Acreage

Wetland Type USFWS Classification	Dominant Plant Species	Land area (acres)
PEM	Baltic rush (<i>Juncus balticus</i>) Cattails (<i>Typha spp.</i>) Sedge (<i>Carex spp.</i>) Hardstem bulrush (<i>Schoenoplectus lacustris acutus</i>) Inland saltgrass (<i>Distichlis spicata</i>) Redtop (<i>Agrostis alba</i>) Foxtail barley (<i>Critesion jubatum</i>)	984.8
PSS	Coyote willow (<i>Salix exigua</i>) Buffaloberry (<i>Shepherdia argentea</i>) Wood's rose (<i>Rosa woodsii</i>) Smooth brome (<i>Bromopsis inermis</i>) Intermediate wheatgrass (<i>Elytrigia intermedia</i>)	31.4
PFO	Narrowleaf cottonwood (<i>Populus angustifolia</i>) Russian-olive (<i>Elaeagnus angustifolia</i>) Smooth Brome (<i>Bromopsis inermis</i>)	60.0
PAB	N/A	92.73
PUB	N/A	25.3
R3US	Willow (spp)	30.5
R3UB	N/A	12.8
R4SB	N/A	76.8

U.S. Fish & Wildlife Service abbreviations used include: Palustrine Emergent (PEM), Palustrine Scrub Shrub (PSS), Palustrine Forested (PFO), Palustrine Unconsolidated Shore (PUS), Palustrine Aquatic Bed (PAB), Palustrine Unconsolidated Bottom (PUB), Riverine Upper Perennial unconsolidated shore (R3US), Riverine Upper Perennial unconsolidated bottom (R3UB) and Riverine Intermittent stream bed (R4SB).

A previous inventory, made in September, 1982 shows similar acres of wetlands in the Mancos Valley. The study indicated there is a total of 1,052 acres of Type 1 and Type 2^{1/} wetlands (Palustrine Emergent as defined by Cowardin) and 18 acres of Type 6 wetlands (Palustrine Scrub Shrub as defined by Cowardin). Most of the wetland acres were used for pasture and hayland or are along stream courses. The wetland types and acreages from the 1982 report are consistent with the recent analysis summarized in Table 9.

1/ Shaw, S.P. and C.G. Fredine, 1956 Wetlands of the United States. USDI-USFWS Cir. 39, 67 p.p.